REMARKS/ARGUMENTS

Claims 39 – 47, 51, 52, 54 and 56 – 66 are presented for examination. Claims 1 – 38, 48 – 50, 53 and 55 have been cancelled.

The subject application was originally filed with 12 claims. Responsive to the March 16, 2005 Office Action, Applicants cancelled claims 1 – 12 and substituted new claims 13 – 65.

The Examiner's Action of October 3, 2005 restricted further prosecution of the application to one of the following inventions:

> Group I: Characterized by claims 13 – 38 as drawn to a method of operating a seismic network.
> Group II: Characterized by claims 39 – 65 drawn to a seismic survey network.

Responsive to the Examiner's Restriction Requirement, Applicants' have elected to prosecute, in this application, the Group II invention characterized by claims 39 – 47, 51, 52, 54, and 56 – 66.

The presently outstanding Office Action of August 9, 2006 rejected claims 39, 41 – 47, 52, 54 and 56 – 66 under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,553,316 to R. Bary et al in view of the June 3, 1998 publication of Ericsson, Snap Track. Claims 40 and 51 were rejected under 35 USC §103(a) as being unpatentable over Bary et al in view of Ericsson and further in view of Patent Application Publication No. US 2003/0128627 to J. Iseli et al.

The elected embodiment of Applicants' invention covers a seismic data acquisition system that includes a multiplicity of seismic data acquisition modules (RAMs) for converting direct seismic sensor signals to useful intelligence in the form of digital data packets. These data packets are transmitted by the RAMs

over a prescribed communication network to a central recording unit (CRU) in a prescribed order.

Operatively combined with a portion of the RAMs is a "first" clock and an "assisted" GPS receiver. Operatively combined with the CRU is a "master" (second) clock and a "master" GPS receiver. Specific to independent claims 39 and 66, the master GPS receiver communicates with the assisted GPS receivers over the network to transmit satellite tracking assistance data and current best-estimate of location data to each of the assisted GPS receivers. The assisted GPS receivers transmit to the master GPS receiver for processing and storage such satellite data as is collected by the assisted GPS receivers. In field practice, circumstances inevitably arise where one or more assisted GPS receivers are placed in an environment having inhibited satellite signal reception. Interactive cooperation and data exchange between the master GPS receiver and the inhibited assisted GPS receiver of the present invention may resolve a location perception for the inhibited GPS receiver with sufficient accuracy for seismic mapping when both the master receiver and the assisted receivers remain stationary over an extended time period. **This is an iterative data processing procedure**. Although not specifically described as such, an iteration procedure is certainly implied to those of skill in the art by the several references to collection, storage, and processing of accumulated data over an extended time period as found in Applicants' specification ¶ [0057]. Once charged with knowledge of the present invention, the art may develop other procedures.

The Office rejection of Applicants' claims 39 – 47, 51, 52, 54 and 56 – 66 first relies upon an **incorrect construction of the Bary et al reference**. The Bary et al patent discloses a seismic survey system having a multiplicity of data acquisition and transmission units RTU. Each data acquisition unit RTU is served by a multiplicity of seismic receivers R. The many data acquisition units are organized into finite groups $GR_{1 \rightarrow n}$ for transmission of accumulated data to respective control and concentration stations $RRS_{1 \rightarrow n}$ (mislabeled RSS on drawing). The control and concentration stations RRS transmit the accumulated data directly to the central control unit CCU.

Implicitly, each of the Bary et al data acquisition units RTU are equipped

with a "local clock (RXGPS) controlled by synchronization signals provided by the external clock (H) in order to generate a dating time scale". Bary et al col. 4, lines 16 – 34. The external clock (H) "is for example **synchronization signals** emitted by a satellite positioning system". Bary et al col. 5, lines 3 – 6. Significantly, the "external clock (H)" is structurally and operatively independent of the Bary et al seismic network. **Emphatically, the "external clock (H)" is <u>NOT</u> an element of the Bary et al network.** It is merely the source of a generic signal used by the Bary et al network. Since the "external clock (H)" is not an operative element of the Bary et al network, it does not respond in any functional manner to signal transmission elements that are elements of the Bary et al network. Ergo, the Bary et al "external clock (H)" cannot, by any reasonable construction or term interpretation, be considered a "master GPS" signal source having <u>reception and transmission interaction</u> with any GPS receiver in the Bary et al network. Applicants' independent claims 39 and 66 require a transmission of GPS data by the master GPS receiver to the assisted GPS receiver and the transmission of any GPS data received by the assisted receiver to the master GPS receiver. Respective receptions, of course should be implied.

The Examiner's attention is directed to a different, **conflicting use** by Bary et al of the term **synchronization signal**: that use found in col. 3, lines 18 – 32. Here, Bary et al use the term "synchronous" in reference to a "time break" signal that is relay transmitted by the CCU to indicate the precise time that the seismic source S is triggered. Col 8, lines 17 – 22. The Bary et al "time break" signal is **not** a **clock** synchronization signal.

Bary et al discloses no dominance/servience relationship between (1) any clock or GPS receiver in their central station (CCU) and (2) any clock or GPS receiver in the local acquisition units (RTU). All of these Bary et al network elements respond equally to the "external clock (H)" signals on the same operational plane. Nothing in the Bary et al disclosure suggests any modification of their "external clock (H)" signals in response to transmissions from either the CCU or the RTUs. Hence, the Examiner's attribution of a "master" and "assisted" relationship between the Bary et al GPS receivers respective to their CCU and the RTUs elements has no justification in fact.

Throughout the August 9, 2006 Office Action, **the terms "master" and**

"assisted" are inappropriately applied. Office Action citations "(Column 3, Lines 10 – 65; Columns 4 – 6; Column 8, Lines 33 – 45)" to the Bary et al specification allegedly supporting this conclusion do not provide such support. **The Office is respectfully requested to apply specific language and phrases from these citations to the terms of Applicant's independent claims 39 and 66. Such an exercise will go far toward a focus of this issue for consideration on Appeal.**

The origin of a master/assisted relationship between GPS receivers in a seismic network arises, exclusively, from Applicants' specification. Merely characterizing the Bary et al receivers as "master" or "assisted" does not, in fact, meet the definition of those terms as found in Applicant's specification paragraphs [0053] – [0057]. In particular, Applicant directly traverses the Office Action allegation that "Bary discloses that the central station comprises a clock that is used as a master clock associated with the GPS timing signal by a GPS receiver to synchronize the system". *Office Action, page 6, lines 3 – 5.* At column 8, lines 39 – 45, Bary et al expressly explain that

> "clock signals emitted at regular intervals (every second for example) by a positioning system such as the GPS (Global Positioning System) system or **synchronization signal** emitted by a radio station and adjusted to an atomic clock. **The synchronization signals** are received by specialized receivers associated with the elements of the seismic device."

Clearly, the Bary et al **clock synchronization signals are emitted by the "external clock (H)"**: not the central station (CCU). **This relationship** described by Bary et al **does not meet the terms of Applicant's claims 39 and 66**. The central station CCU of Bary et al does **not** transmit **clock** synchronization signals (or GPS best estimate or tracking assistance data signals) to the local acquisition units RTU.

The Office Rejection of Applicants' claims 39 – 47, 51, 52, 54 and 56 – 66 also relied upon a combination of disclosure from the **Ericsson publication** with the Bary et al disclosure. The Ericsson publication proposes an "Assisted GPS" method of using the Global Positioning System (GPS) as a solution to positioning requirements in GSM-based networks, i.e. cellular telephones. In the Examiner's opinion,

"It would have been obvious to modify Bary, who relies on the GPS signal at each of the units in a seismic survey network, to include the assisted GPS technology taught by Ericsson in order to able (sic) to provide better coverage of the entire survey area with the GPS satellite signals so that receivers that lose the signal due to terrain blockage can still be covered by the GPS signals." Office Action, page 5.

Notably, the motivation to combine the teachings of Bary et al and Ericsson as described by the Examiner is not to be found in the disclosures of either Bary et al or Ericsson. The Bary et al GPS receivers are described in relation to a clock synchronization procedure. No positional mapping or unit location functions are mentioned in the Bary et al specification. Furthermore, Bary et al makes no mention of satellite signal reception difficulty. Obviously, Bary et al failed to notice that there was a problem. How, then, could Bary et al suggest or teach a combination with the Ericsson disclosure to solve a problem that Bary et al did not know that they had.? Clearly, the Examiner's explanation of a "motivation" to combine selected teachings of Ericsson with the Bary et al disclosure originates not from the prior art but from Applicant's disclosure.

In the terms of 35 USC §103(a), a patent application may be rejected "if the subject matter *as a whole* would have obvious *at the time the invention was made* to a person having *ordinary skill in the art to which said subject matter pertains.*" Respectfully, what technological discipline does the Examiner consider to be the "art" to which the present "subject matter pertains"? Is it seismology or telecommunications? The Ericsson art is telecommunications. Since Applicant's disclosure and claims are directed to a "seismic survey network", it would seem that "***the art to which said subject matter pertains***" in this case is the seismology arts. Why then, would a seismologist, your Applicants, look to the telecommunication arts to overcome his problem of lost or weak satellite signals? It must be recognized that for the disclosures of both Bary et al and Ericsson, the GPS technology is adjunctive. GPS signal processing is not a core element to the successful practice of either art. Seismic surveys were being conducted long before the first GPS satellite was launched. Similarly, the cellular communication technology developed in complete

independence of the GPS technology. Moreover, the underlying parameters driving the Ericsson proposal include an instantaneous, albeit relatively coarse, position identity for a moving transmitter. In contrast, the underlying parameters driving Applicants' invention include the precise position identity of a stationary transmitter without substantial restriction of how long it takes to acquire it.

Assuming, arguendo, that an "ordinarily skilled seismologist" reads the Ericsson proposal for reasons neither understood nor explained here. This ordinarily skilled seismologist would not progress far before he would find critical information that would discourage further consideration or examination of the Ericsson proposal. In the second paragraph of page 3, second sentence, Ericsson touts his DGPS (Differential GPS) technology by asserting that "it is relatively easy to achieve both horizontal and vertical accuracy better than **10m** RMS." Really! Seismologists of ordinary skill in the art are well aware of the necessity for identifying the topographical location of system sensors (geophones) within **1 to 3 meters** depending on the depth of information required. As the Seismologist of "ordinary skill" proceeds toward the end of the Ericsson publication, he finds the data of Tables 2.1.1a and 2.1.1b. In Table 2.1.1b it is reported that the best Ericsson accuracy was **5m** and that was under ideal conditions and then for only 90% of tests. Accordingly, the Ericsson disclosure would not appear to offer much promise to one of ordinary skill in the seismic arts for achieving Applicant's objectives.

Reviewed more broadly, the Ericsson objective is to identify the momentary location of a mobile cell phone. Since the "assisted" GPS receiver of the cell phone may be moving rapidly, iterative positioning calculations are useless. By the time the signal parameters are resolved, the transmitter (cell phone) location has moved. Furthermore, **the 10m magnitude of accuracy reported as tolerable by Ericsson is intolerable to the art of seismology**. Hence, the Ericsson disclosure has no direct relevance to Applicants' seismic survey network.

Comparatively, the relevant characteristics of a seismic survey network as claimed by Applicants are that the data acquisition modules which incorporate GPS receivers are stationary and remain so for relatively long periods of time. The Ericsson GPS receivers are mobile and enjoy no fixed location. In the

seismic survey arts, seismic sensor locations are precisely located relative to the data acquisition module which, in the present application, incorporates the assisted GPS receiver. The required degree of position accuracy for a seismic data acquisition module is 100% within 1 to 3m. The Ericsson operational accuracy is only 10m and that is achieved only 90% of the time. The Ericsson disclosure allows less than 100 seconds to make a location resolution whereas a seismic survey may accommodate days or even weeks to iteratively resolve an assisted receiver position. See Ericsson page 7, line 2. Clearly, the Ericsson publication could not be perceived as an encouraging endorsement of assisted GPS for utilization by one of "ordinary skill" in the seismology arts. Consequently, the Examiner's rationalizations for motivation to combine the disclosure of Ericsson with that of Bary et al would appear to be an exercise in prohibited hindsight.

The Court of Appeals of the Federal Circuit has explained that "[o]ur case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analyses is *rigorous* application of the requirement for a showing of the teaching or motivation to combine prior art references." *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir.1999). The reason is because "combining prior art references without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight." *Id.* At 999. "Particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed." *In re Kotzab*, 217 F.3d 1365,1371 (Fed. Cir. 2000). "In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed". *In re Rouffet,* 149 F.3d 1350, 1357 (Fed. Cir. 1998)

The Federal Circuit in *Teleflex, Inc. v. KSR Int'l Co.*, 119 Fed. Appx. 282, 286 (Fed. Cir. 2005), cert granted sub nom. *KSR Int'l Co. v. Teleflex, Inc.*, 548 U.S.__(2006) noted that "[t]herefore, we have consistently held that a person of

ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but some motivation to combine the prior art teachings in the particular manner claimed."

Applying the foregoing stare decisis expressions of U.S. patent law to the present circumstance, Applicants' claims 39 and 66 describe a seismic survey network having a central recording unit and a number of data acquisition modules. The data acquisition modules have connected seismic sensors, a clock (first) and an assisted GPS receiver. The central recording unit has a clock (second) and a master GPS receiver. A communication network connects the central recording unit to the data acquisition modules. Satellite tracking assistance data and current best-estimate location data is carried by the communication network from said master GPS receiver to said assisted GPS receiver. Conversely, the communication network carries satellite data as may be collected by the assisted GPS receiver to the master GPS receiver. The master GPS receiver is described by applicant's specification as fully capable and includes extensive data storage and data processing power. Specification ¶ [0057]. The assisted GPS receiver may be of more economical construction with reduced power and signal tracking capability. Specification ¶ [0056].

Although the Bary et al patent discloses the presence of GPS receivers in the data acquisition units RTU and the central control unit CCU, no exchange of terrestrial positioning information between these GPS receivers is taught or suggested by Bary et al. In fact, the Bary et al disclosure includes nothing about terrestrial location functions of the GPS receivers. The only use by Bary et al of GPS receivers is for receipt of time synchronization signals. Quite obviously, if Bary et al were using the CCU supported GPS receiver as a "master" clock synchronization signal source, they would have no need for GPS receivers in all of their data acquisition units. Respectfully, it would appear that, like the terrestrial location functions attributed by the Examiner to the Bary et al disclosure, the master/assisted control signal relationship between the Bary et al CCU and RTU units has been transposed by prohibited hindsight from Applicant's disclosure.

Before Applicants' invention, the concept of master/assisted GPS receivers combined with a seismic survey network was non-existent. GPS assisted cell phones as proposed by Ericsson had no bearing on the seismology arts until taught, in particular, by Applicants. Only a small kernel of commonality exists between the Bary et al disclosure and that of Ericsson. Moreover, this common kernel of Ericsson is buried amongst a pile of irrelevancies and contradictions. If we define that kernel as the general relationship of network communication between a "master" and "assisted" GPS receiver, where or how does Ericsson teach the operative combination of the master GPS receiver with the seismic central control unit? Why not a stand alone "master" as taught by Ericsson? The kernel is certainly NOT to be found in Bary et al. In Ericsson it is the "master" that reports the whereabouts of the "assisted". In Applicant's invention, it is the "assisted" that reports it's whereabouts to the seismic data recorder. The Applicants' seismic data recorder serves a different function from that of the "master" GPS receiver. In a certain spin of the language, perhaps Applicant's could have described the "master" receiver as the assisted and vice-versa. In this perspective, it is Applicant's "master" receiver that is assisting the GPS (assisted) receiver in the data acquisition module to acquire it's position coordinates for useful integration into the seismic data record. Now that Applicants' have described their invention, the Examiner has followed the Application "blueprint" to the kernel buried in the Ericsson pile. **This is the precise exercise of hindsight prohibited by the law.**

Most recently, the Federal Circuit has explained that:

> "In considering motivation in the obviousness analysis, the problem examined is not the specific problem solved by the invention but the general problem that confronted the inventor before the invention was made. [case citations] Therefore, the 'motivation-suggestion-teaching' test asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims. From this it may be determined whether the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art – i.e., the understandings and knowledge of persons having ordinary skill in the art at the time of the invention – support the legal conclusion of

obviousness." *In re Kahn*, 441 F.3d 997, 988 (Fed. Cir. 2006).

Applicant's claims 40 and 51 are both dependent from independent claim 39 and are therefore patentably novel over the prior art of Bary et al and Ericsson for the same reasons as explained above. The addition of the Iseli et al disclosure to the claims 40 and 51 rejection combination does not cure the fundamental failings of a hindsight combination of Bary et al and Ericsson. The Iseli et al seismic survey system includes no GPS technology, assisted or otherwise. This being said, however, the Examiner clearly misinterprets the Iseli et al relevance to the parameters of claim 40. The Iseli et al data acquisition modules do not receive digital seismic data along the communication network as expressly required by claim 40. The Iseli et al data acquisition modules <u>receive</u> seismic data, exclusively, from the seismic sensors: <u>not from the network</u> The scope of Applicants' "communication network" as defined by parent claim 39 is among the data processing modules and the central recording unit. The seismic sensors are described by parent claim 39 as a subcombination element of a data acquisition module i.e. a "data processing module". Consequently, in the terms of Applicants' claims, the Iseli et al data acquisition modules only originate digital seismic data for transmission along a communication network. The Iseli et al data acquisition modules <u>do not receive</u> digital seismic data along the network as claimed. Of course Applicant's data acquisition modules originate seismic data and transmit it into the network. However, Applicants' data acquisition modules also <u>receive</u> and <u>re-transmit</u> such seismic data. This, Iseli et al does not do.

Arguments and Remarks submitted herewith describe and explain the patentably novel distinctions of Applicants' invention over the cited prior art. There being no further issues, Applicants respectfully request the Examiner's allowance of remaining claims 39 – 47, 51, 52, 54, and 56 – 66. However, in view of the protracted course of this prosecution and the complex nature of the technology, Applicants are submitting their request for an interview with the Examiner at a mutually agreed time during the week of November 27, 2006.

Applicants expect to be represented by their attorney of record and one or two credentialed experts in the art of seismology. Applicants' Interview Request Form PTOL 413A is enclosed herewith. A copy of the Form PTOL 413A is being transmitted directly to the Examiner by facsimile on this date of mailing.

Respectfully Submitted,

Date: November 14, 2006

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CERTIFICATE OF MAILING UNDER 37 CFR §1.8(a)

I hereby certify that this correspondence, along with any referred to as enclosed or attached, is being deposited with the United States Postal Service as Express Mail, Label No. **EQ 846596229 US**, Postage prepaid, in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on this 14th day of November, 2006.

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